Claims

[1] 1. A low density parity check (LDPC) error correction method comprising:
generating a resultant matrix (m*1) by performing an XOR operation and a modular 2 operation with respect to an LDPC matrix (m*n) and a code word vector (n*1);
determining whether a decoding of the code word vector succeeded on the basis of the resultant matrix;
if it is determined that the decoding failed, detecting a code word bit, in which an error is generated, in the code word vector on the basis of correlations of components of the LDPC matrix, the code word vector, and the resultant matrix; and
correcting the error by changing a binary value of the detected code word bit.
2. The method of claim 1, wherein the detecting of the code word bit in which the error is generated comprises:
checking whether the same column vector as the resultant matrix exists in the LDPC matrix; and
if the same column vector as the resultant matrix exists in the LDPC matrix, detecting a code word bit corresponding to a column number of the searched column vector in the code word vector as an error generation code word bit.
3. The method of claim 1, wherein the detecting of the code word bit in which the error is generated further comprises:
if the same column vector as the resultant matrix does not exist in the LDPC matrix, determining that the decoding failed and ending the error correction process.
4. The method of claim 1, further comprising:
detecting the number of generated 1-bit errors based on the number of 1s included in the resultant matrix.
5. The method of claim 4, whereinthe detecting the number of generated 1-bit errors comprises:
checking whether the number of 1s included in the resultant matrix is the same as a column weight of the LDPC matrix; and
if the number of 1s included in the resultant matrix is not the same as a column weight of the LDPC matrix, ending the error correction process by determining that the decoding failed.

6.The method of claim 3, further comprising:
generating a new resultant matrix (m*1) by performing the XOR operation and modular 2 operation with respect to the LDPC matrix (m*n) and a corrected code word vector (n*1) in which the binary value of the code word bit is changed and determining whether a decoding of the corrected code word vector succeeded on the basis of the new resultant matrix.

7.Anerror determination method comprising:
a first decoding success/failure determination step of generating a resultant matrix (m*1) by multiplying an LDPC matrix (m*n) by a code word vector (n*1) and determining whether a decoding of the code word vector succeeded on the basis of the resultant matrix;
and a second decoding success/failure determination step of, if it is determined that the decoding failed, determining again whether the decoding succeeded on the basis of the number of 1s included in the resultant matrix.

8.The method of claim 7, wherein the second decoding of success/failure determination step comprises:
determining that the decoding failed if the number of 1s included in the resultant matrix is not the same as a column weight of the LDPC matrix.

9.The method of claim 7, further comprising:
a third decoding success/failure determination step of determining whether the decoding succeeded or failed by checking whether the same column matrix as the resultant matrix exists in the LDPC matrix.

10.Alow density parity check (LDPC) error correction apparatus comprising:
a decoding success/failure checking unit generating a resultant matrix (m*1) by performing an XOR operation and a modular 2 operation with respect to an LDPC matrix (m*n) and a code word vector (n*1) and determining whether a decoding of the code word vector succeeded on the basis of the resultant matrix;
an error location detector searching the same column vector as the resultant matrix in the LDPC matrix and, if the same column vector exists, detecting an error location by detecting a column number of the same column vector; and
a binary value changing unit correcting the error by changing a binary value of a code word bit corresponding to the detected column number in the code word vector.

11. The apparatus of claim 10, wherein the error location detector,if the same column matrix as the resultant matrix does not exist in the LDPC matrix,

determines that the decoding failed and ends the error correction process.

12. The apparatus of claim 10, further comprising:

an error count detector determining

whether the number of 1s included in the resultant matrix is the same as a column weight of the LDPC matrix and, if they are not the same, ending the error correction process by determining that the decoding failed.